Space Weather Forecast

Issued on Sunday, 15 October 2023 at 01:16 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Minor Geomagnetic Storm G1 around the start and middle of the coming UTC working week. Chance of R1 Minor Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low in the past 24 hours, with X-ray activity peaking with an upper-end Common-class flare at 14/0515UTC from a sunspot in the southwest, with a second smaller, long-period Common-class flare produced at 14/1633UTC from the eastern solar hemisphere. Neither event appears to have produced any Coronal Mass Ejection (CME).

There are up to six sunspot regions on the Sun at present. Some solar imagery for the past 24 hours has again been intermittent, and lower resolution ground-based alternatives have been employed to fill data gaps. None of the current front side sunspot groups appear especially complex in available imagery, with the main discernible trend being of emergence of trailing spots in a sunspot in the northwest and a spreading tendency here.

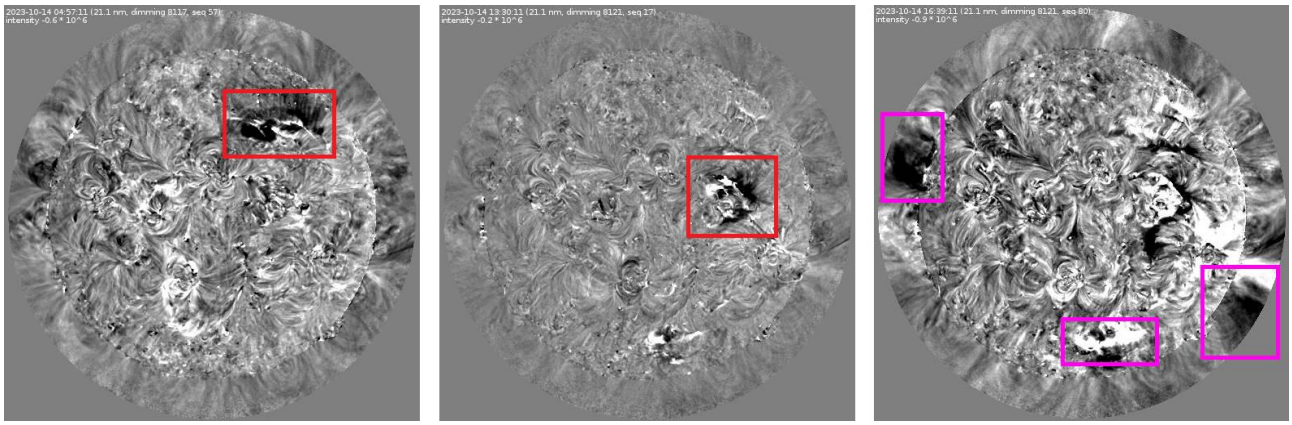

Figure 1: Main SIDC ROB time-integrated extreme UV ‘coronal dimmings’ (sometimes signatures of released CMEs) for the past 24 hours. The two red-boxed events have been modelled as potentially having glancing incidence in the UTC day of Wednesday 18 October. The three magneta-boxed events were noted, but have either not conclusively proven to be Earth-directed, or have not demonstrably left the immediate solar environment.

There were numerous candidates for CMEs observed in the past 24 hours.

There were potentially up to three noted 'filament eruptions' (arcs of plasma ejected into interplanetary space) - firstly one from the northwest starting around 14/0340UTC. This has been modelled and results in a possible glancing blow of Earth due late in the UTC morning of Wednesday 18 October.

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The second notable event also left the northwest of the Sun 14/1240UTC. This CME may add to or very closely follow the above glance in the UTC morning of Wednesday 18 October.

The third event was a low solar latitude disappearing filament from 14/1400UTC. The resulting ejecta is not obviously apparent on imagery, with a larger southwestern solar horizon CME at 14/1630UTC possibly swamping any ejecta and dominating imagery. Provisionally the filament is considered too low latitude to feature at Earth, and the polluting southwest horizon event is likely too far west, although both will be fully assessed in due course.

Solar Wind / Geomagnetic Activity: Solar winds suggest erratic ongoing connection to a fast wind emanating from a coronal hole.

The solar wind speed showed early elevated peaks, with a general declining trend observed thereafter into slightly elevated levels. The number of particles in the solar wind was at background levels and often near the lower limit of measurement capability. The associated magnetic field was within background levels, with the north-south component displaying a slight co-aligned bias with Earth's field (to help limit geomagnetic effects).

The net result of the above solar wind measures was for provisionally mainly quiet geomagnetic activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a slightly rising chance of Moderate-class flares at first in the four-day period as a result of potential returning sunspot regions, with the risk likely to have plateaued into the new UTC working week. The risk then moderates slightly midweek with the departure of one of the more active front-side regions.

Solar Wind / Geomagnetic Activity: The current fast wind should wane through the remainder of the current UTC weekend, becoming increasingly quiet. A second 'coronal hole' fast wind should then arrive later in the UTC day of Monday 16 October, bringing a chance of Minor Geomagnetic Storm G1. Up to two CMEs then feature in the forecast, both low confidence and both glances, but potentially crossing Earth orbit later in the UTC morning of Wednesday 18 October, and giving a further chance of G1, probably with a preceding lull in activity as the fast wind matures.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	30	10	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	40	40	30
Very Active	R3 to R5 X	No	1	5	5	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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